RUNNING AND HANDLING PROCEDURE FOR U.S. STEEL USS-EAGLE INTEGRAL CONNECTION SERIES	**Procedure: ENG 11** **Revision: 7** **Effective Date: 08/13/2025** **Page: 1 of 18**

1.0 Applicable Connections

1.1 USS-EAGLE SFH®

1.2 USS-EAGLE SFH® SC (Special Clearance)

1.3 USS-EAGLE SFM®

1.4 USS-EAGLE SFM® SC (Special Clearance)

1.5 USS-EAGLE SFM® I

1.6 USS-EAGLE FJM®

2.0 Scope

2.1 This engineering procedure describes the requirements for running and pulling of U. S. Steel (USS) premium connections. No variations from these requirements shall be permitted without written approval from a U. S. Steel representative.

3.0 Definitions

3.1 Premium Connections – Proprietary connections that incorporate a metal-to-metal seal to create a gas tight seal.

3.2 Make-up Signature – A graph that is generated from the Torque vs. Turn or Torque vs. Time monitoring system. This is also called a make-up graph. See Figures 1-5.

4.0 Reference Documents

4.1 ENG 05 Approved Running and Storage Compounds and Thread Protectors.

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5.0 Equipment Requirements

5.1 Accessory Equipment

5.1.1 Inspection of all accessory equipment and backup equipment, such as crossovers, safety subs, float equipment and packer assemblies, shall be conducted prior to any operation. Care shall be taken to ensure that the proper connection is threaded on all accessories.

5.1.2 Only accessories threaded by a USS facility or licensed manufacturer or repair shop shall be used. Unauthorized connections can jeopardize the entire string resulting in catastrophic consequences.

5.1.3 Handling plugs provided by USS shall be used.

5.1.3.1 Handling plugs must be made up hand tight until the connection is snug. Extreme care shall be used to ensure the handling plug is not cross-threaded in the box during make-up. Dial calipers, a go/no go gauge, or an equivalent measuring device shall be used to measure the distance between the box face and the external handling plug shoulder after make-up. The measured stand-off may not exceed the values listed in Tables 1-6.

Table 1: USS-EAGLE SFH® Acceptable Handling Plug Stand-off

Product Line	Size Range	Max. Stand-off
USS-EAGLE SFH®	4.500 x 0.375 – 0.430 wall 5.000 x 0.422 – 0.478 wall	0.40
USS-EAGLE SFH®	5.000 x 0.500 wall 5.500 x 0.476 – 0.562 wall	0.45
USS-EAGLE SFH®	4.500 x 0.290 wall 5.500 x 0.304 wall 6.625 x 0.432 wall	0.50
USS-EAGLE SFH®	4.500 x 0.337 wall 5.000 x 0.362 – 0.408 wall 5.500 x 0.361 – 0.415 wall 7.000 x 0.453 – 0.498 wall 7.625 x 0.465 – 0.562 wall 8.625 x 0.352 wall	0.55
USS-EAGLE SFH®	6.000 x 0.453 wall 6.625 x 0.352 – 0.417 wall 7.000 x 0.362 – 0.408 wall	0.60
USS-EAGLE SFH®	7.625 x 0.375 – 0.430 wall	0.65

Table 2: USS-EAGLE SFH® SC Acceptable Handling Plug Stand-off

Product Line	Size Range	Max. Stand-off
USS-EAGLE SFH® SC	6.000 x 0.400 – 0.436 wall 6.625 x 0.417 wall	0.60
USS-EAGLE SFH® SC	7.625 x 0.375 wall	0.65

Table 3: USS-EAGLEE SFM® I Acceptable Handling Plug Stand-off

Product Line	Size Range	Max. Stand-off
USS-EAGLE SFM® I	9.625 x 0.472 - 0.545 wall	0.65

Table 4: USS-EAGLE FJM® Acceptable Handling Plug Stand-off

Product Line	Size Range		Max. Stand-off
USS-EAGLE FJM®	11.750	0.489	0.65

Table 5: USS-EAGLE SFM® Acceptable Handling Plug Stand-off

Product Line	Size Range	Max. Stand-off
USS-EAGLE SFM®	13.625 x 0.625 wall 13.750 x 0.707 wall 13.875 x 0.750 wall 13.875 x 0.755 wall 14.000 x 0.650 – 0.820 wall 14.150 x 0.895 wall	0.70
USS-EAGLE SFM®	16.000 x 0.656 wall 16.040 x 0.667 wall	0.75

Table 6: USS-EAGLE SFM® SC Acceptable Handling Plug Stand-off

Product Line	Size Range	Max. Stand-off
USS-EAGLE SFM® SC	16.000 x 0.781 – 0.852 wall 16.150 x 0.723 – 0.772 wall	0.60
USS-EAGLE SFM® SC	16.200 x 0.800 wall 16.250 x 0.825 wall	0.65
USS-EAGLE SFM® SC	16.000 x 0.688 – 0.715 wall 16.080 x 0.667 wall 16.100 x 0.625 wall	0.75
USS-EAGLE SFM® SC	14.000 x 0.820 wall	0.70

5.2 Elevators

5.2.1 Slip type or spider type elevators are required. Slips shall not be set over the threaded area or any formed area of the connection. Bottleneck elevators shall not be used.

5.3 Power Tongs, Gauges, and Torque Recorders

5.3.1 Tongs shall be in good condition with jaws that correctly fit the pipe.

5.3.2 Make-up torque should be accurately measured and controlled. Torque measuring equipment shall be in good working order and cover the appropriate range and be properly calibrated.

5.3.3 If a snub line is used, it shall be set at a 90-degree angle to the arm of the tong.

5.4 Thread Protectors

5.4.1 Properly fitting, clean thread protectors shall be installed on each connection when stored on pipe racks or when pipe is being moved.

5.4.2 It is recommended that thread protectors be removed as close as practical to the start of the casing running. If the casing run is delayed, thread protectors should be replaced on connections to avoid prolonged exposure to the environment and debris.

5.5 Thread Field Inspection and Repair

5.5.1 Threads shall be thoroughly cleaned and dried prior to inspection to remove all dirt, thread or storage compound, or other residue. Proper cleaning solution shall be used. Do not use metal brushes or other abrasive methods that will cause scratching of the threads or seals.

5.5.2 An authorized USS Representative shall perform a thread inspection to evaluate for damage and corrosion.

5.5.3 Minor anomalies on thread surfaces may be field repaired. Damage to seal surfaces, other than very minor oxidation, is cause for rejection. After repairs, threads and seal shall be cleaned and dried. Molybdenum Disulfide spray shall be applied to all repaired areas.

6.0 Thread Locking Procedure

6.1 A combination of thread running compound and thread locking compound shall be used when thread locking compound is required.

6.1.1 Pin Application: Apply a thin, uniform coat of thread running compound to seal(s) and first two threads on pin, covering the entire circumference. Apply a thin, uniform coat of thread locking compound on the remainder of the threads on the pin, including the imperfect thread area, covering the entire circumference. The thread locking compound must be well worked into the thread form.

6.1.2 No thread locking compound shall be applied to the box. The box connection shall remain bare.

6.1.3 A torque in excess of the connection maximum make-up torque may be required to make-up the connections.

6.1.4 The use of excessive thread locking compound may result in an improper connection make-up.

6.1.5 Mixing of thread running compound and thread locking compound is acceptable at the mating areas.

7.0 Running Procedure

7.1 Pipe Handling

7.1.1 Extreme care shall be used when handling pipe. Pipe shall not be moved unless the threads, both pins and boxes, are protected with thread protectors. Pipe shall be lifted with straps, not hooks. If a soft line is used it shall be double wrapped when picking up a joint of pipe.

7.2 Thread Running Compound

7.2.1 Thread compound shall be applied to clean, dry connections.

7.2.2 Thread running compound and applicator shall be free of foreign contaminates (sand, dirt, etc.). It is recommended that a new container of compound be used at the start of each job. Diesel or other thinning agents shall not be added to thread running compound for any reason.

7.2.3 Thread compound shall be specifically designed for use with premium connections. Reference ENG 05 latest revision for a list of approved thread compounds. All other premium connection compounds shall be reviewed and approved by USS Product Engineering prior to use.

7.3 Thread Running Compound Application

7.3.1 Apply a thin uniform coat of thread compound to the entire thread and seal surfaces of the box connection only; the pin shall remain bare. The compound shall be applied evenly so that thread form is visible. A mustache brush is highly recommended for application.

7.4 Stabbing and Thread Engagement

7.4.1 A stabbing guide shall be used on the box end to prevent damage to thread and seal surfaces.

7.4.2 The pipe must be in vertical alignment over the box. Movement or sway of the pipe shall be held to a minimum. Only after the pipe is positioned properly, the pipe shall be slowly lowered into the box until the stab flanks of the pin are in contact with the stab flanks of the box.

7.4.3 A weight compensator is recommended, especially when running large diameters and doubles.

7.4.4 Remove stabbing guide after stabbing. Rotate the pipe by hand to insure proper thread engagement. Tongs can be used to slowly rotate the pipe for thread engagement verification if weight restricts doing this by hand. NOTE: Slack shall remain in the snub line and no appreciable torque buildup shall be seen during this process. If connection is not stabbed correctly, rotate the connection counter-clockwise 1/4 to 1/2 turn to correct. Pipe shall not be rocked back and forth during thread engagement.

7.5 Power Make-up

7.5.1 Power tongs are required. Casing running tools (CRTs) may be used for rotating pipe only. Pipe wrenches, rig tongs or spinning chain shall not be used for connection make-up. Make-up at a steady and controlled speed, shifting from high gear to low gear prior to seal engagement. Table 7 lists high gear and low gear RPM. Make-up to within the recommended stand-off and make-up torque range. Backup tongs shall be located as close to the power tong as possible to prevent bending during make-up, but no closer than 15 inches from box face. Backup tongs shall not be set over the box end under any circumstances. The elevator should not be latched until the make-up process is complete.

Table 7: Power Make-up Speeds

Product Line	High Gear RPM	Low Gear RPM
USS-EAGLE FJM® USS-EAGLE SFM® USS-EAGLE SFM® I USS-EAGLE SFH®	10 Maximum	5 Maximum

7.6 Make-up Torque and Stand-off

7.6.1 USS Product Information Data sheets provide torque values for USS proprietary connections. The torque values listed are the minimum and maximum recommended make-up torques, as well as the connection maximum operational torque. The minimum and maximum recommended make-up torques can be averaged to obtain an optimum torque, however a connection with an acceptable make-up signature that has a final torque reading within the minimum and maximum torque window shall be considered acceptable. Torque values are recommended and can be affected by field conditions.

7.6.2 Make-up acceptance is based on stand-off location and final torque, with stand-off being the main determining requirement. Dial calipers or an equivalent measuring device shall be used to measure the distance between the box face and the external pin shoulder after power make-up. See Table 8 for Acceptable Connection Stand-off Distances. Final make-up location shall be verified upon completion of all connection make-ups by an authorized USS representative.

Table 8: Acceptable Connection Stand-off Distances

Product Line	Stand-off Range
USS-EAGLE SFM®	0.20” – 0.28”
USS-EAGLE SFH®	0.22” – 0.28”
USS-EAGLE FJM®	0.16” – 0.26”
USS-EAGLE SFM® I	0.16” – 0.26”

7.6.3 The authorized USS representative has the authority to accept connections which are outside the minimum and maximum torque window. When all other make-up requirements are met, the value shall not exceed 10% below or above the recommended torque value.

7.7 Break-out

7.7.1 When break-out of a connection is necessary, backup tongs shall be applied to the pipe body below the box end with the leading edge below the box transition area.

7.7.2 Elevators shall be unlatched prior to break-out. Place power tongs and backup tongs as close to each other as possible, but no closer than 15 inches from box face, to prevent bending during break-out. Slowly apply torque required to break-out connection. Never strike the connection to assist in break-out. Doing so will result in damage to the connection and will jeopardize its performance. A weight compensator should be used during the break-out process whenever possible to prevent damage to the connection. For 8 5/8 and larger OD or heavy wall pipe, break-out with weight compensator is recommended. Use power tongs to back out in low gear until the pipe can be rotated with a strap or chain wrench to complete the removal.

7.7.3 Stop rotation immediately when the pin jumps inside the box. The use of a stabbing guide is required when lifting the pin out of the box. Lift the pin out slowly to avoid damage. Remove power tongs prior to separating the pin from the box connection.

7.7.4 Install clean, dry thread protectors prior to pipe movement.

8.0 Torque Monitoring Equipment

8.1 The use of a computerized torque monitoring system is highly recommended for make-up of USS proprietary connections. The use of such equipment permanently records the make-up signature and final torque of each connection. It also gives the opportunity to evaluate the connection make-up prior to running the connection in the hole.

8.1.1 Torque vs. Turn plots are required. These plots shall be evaluated for signature characteristics. Any major anomalies shall require break-out of the connection. Inspection and repair of the connection, if needed, shall be conducted prior to the connection being re-made.

8.2 Setup of torque monitoring equipment

8.2.1 Minimum and maximum recommended make-up torques are listed on the USS connection performance sheet.

8.2.2 Reference torque shall be set between 200 to 600 ft-lbs.

8.2.3 Graph size and scale shall be set to produce a clear signature curve of the make-up. A maximum of two curves per sheet of paper are permitted on printed output.

9.0 Disposition of Make-up Curves

9.1 Make-up curves or signatures display the relationship of torque vs turns or torque vs. time. These curves demonstrate the make-up characteristics of each connection. The signatures should look similar to other signatures of the entire string of pipe. Any major abnormalities shall result in break-out of the connection to examine for damage and to determine the cause of the unusual graphs. USS representatives are responsible for acceptance or rejection of the connection make-up curve.

9.1.1 An acceptable make-up signature is shown in Figure 1. The final torque shall fall between the minimum final torque and the maximum final torque values. The make-up position of a connection with this signature shall be verified through an acceptable stand-off measurement. If proper make-up location is achieved, the connection shall be accepted.

9.1.1.1 If the make-up location has not been achieved, additional torque (up to 90% of connection maximum operating torque) may be applied to the connection to achieve acceptable make-up location.

9.1.1.2 If the make-up location is beyond the acceptable limit, the connection shall be broken out, and inspected as outlined in section 7.7. Connection is to be reassembled at 80% of minimum torque and make-up position shall be verified.

9.1.2 A questionable make-up signature is defined as an irregular appearing signature that is significantly different than the acceptable make-up signature (Figure 1) and the signatures from the rest of the order. Some examples of reject signatures are:

9.1.2.1 Final torque falling below the minimum torque value (Figure 2). The make-up position of a connection with this signature shall be verified. If proper make-up location is achieved, the connection shall be accepted. If the make-up location has not been achieved, additional torque (up to 90% of connection maximum operating torque) may be applied to the connection to achieve acceptable make-up location. If the make-up location is beyond the acceptable limit, the connection shall be broken out, and inspected as outlined in section 7.7. Connection is to be reassembled at 80% of minimum torque and make-up position shall be verified.

9.1.2.2 Final torque exceeds the maximum torque value (Figure 3). The make-up position of a connection with this signature shall be verified. If proper make-up location is achieved, the connection shall be accepted. If the make-up location has not been achieved, additional torque (up to 90% of connection maximum operating torque) may be applied to the connection to achieve acceptable make-up location. If the make-up location is beyond the acceptable limit, the connection shall be broken out, and inspected as outlined in section 7.7. Connection is to be reassembled at 80% of minimum torque and make-up position shall be verified.

9.1.2.3 Yielding or deformation indications prior to final torque release (Figure 4). A connection with this signature shall be broken out and the pin and box connection shall be rejected.

9.1.2.4 Irregularities in the make-up chart (Figure 5). A connection with this signature shall be broken out and

inspected as outlined in section 7.7.

9.1.3 In the case of a rejected signature curve, the connection in question shall be subjected to a backout evaluation.

9.1.3.1 If the connection make-up signature is rejected, the pin shall be broken out completely to expose the entire pin and box connection.

9.1.3.2 The pin and box shall be thoroughly cleaned and visually inspected for damage to the threads and seal area.

9.1.3.2.1 Connections found with detrimental damage in the thread area (galling) or any damage on the seal surface, the connection shall be rejected and marked appropriately. Minor thread damage can be field repaired.

9.1.3.2.2 Connections with no damage may be reassembled.

9.1.3.3 If the second make-up signature is acceptable or similar to the first make-up signature and final torque of the second make-up are within the acceptable limits, the connection shall be considered acceptable.

9.1.3.4 Connections shall not be made up more than three times. After third attempt to get an acceptable make-up signature, the connection shall be rejected and shall not be used.

10.0 Common Causes of Connection Damage

10.1 When connections are experiencing galling or torn metal during break-out of signature rejects, there are some common causes that can be evaluated to correct this issue. Some of these causes are as follows:

10.1.1 Foreign materials (sand, dirt, diesel, or other) on threads and/or in thread compound. Reference section 7.2.

10.1.2 Insufficient or improperly applied thread compound. Proper thread compound application is critical to connection make-up. Reference section 7.3.

10.1.3 Misalignment from vertical during stabbing, make-up or break-out. Reference section 7.4.

10.1.4 Rocking of pipe to correct cross threading. Reference section 7.4.

10.1.5 Setting backup tongs over box threads. Reference section 7.5.

10.1.6 Continued rotation of pipe after threads have disengaged during pulling of pipe. Reference section 7.7.

10.1.7 Improper handling of pipe during storage and movement of pipe. See section 7.1.

10.1.8 Use of accessories with non-authorized USS connections. See section 5.1.

10.1.9 Over torque of the connection. See section 7.6.

11.0 Revision Notes

11.1 Updated document section callouts as needed.

11.2 Updated Table 7 for USS-EAGLE SFH® to follow product family RPM values.

11.3 Updated Section 8.1.1 so that Torque vs. Turn plots are required.

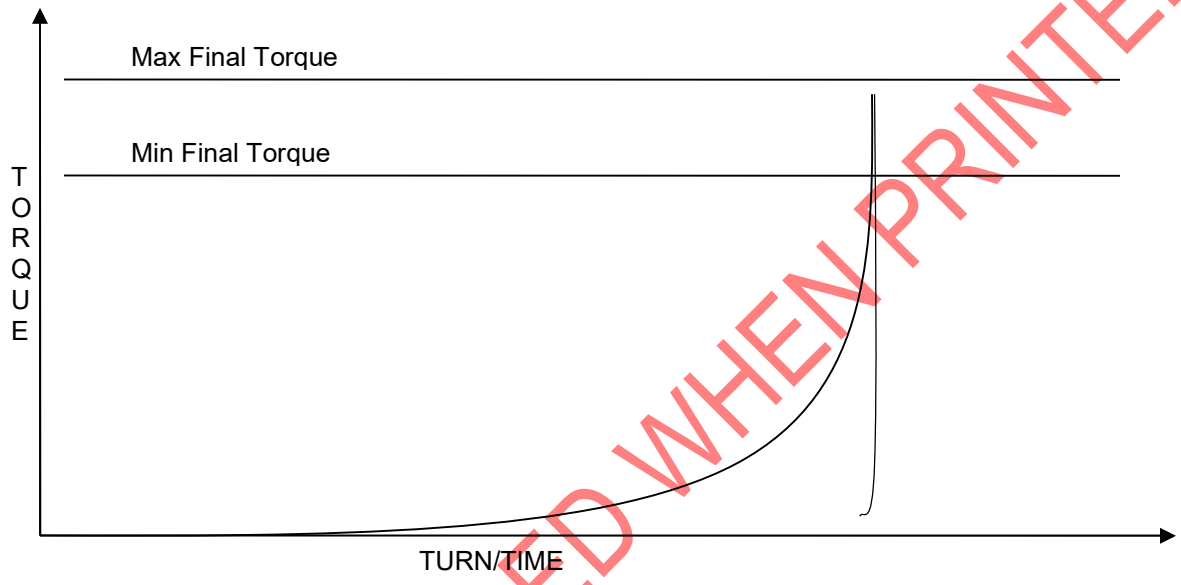

Figure 1: Typical Acceptable Make-up Signature

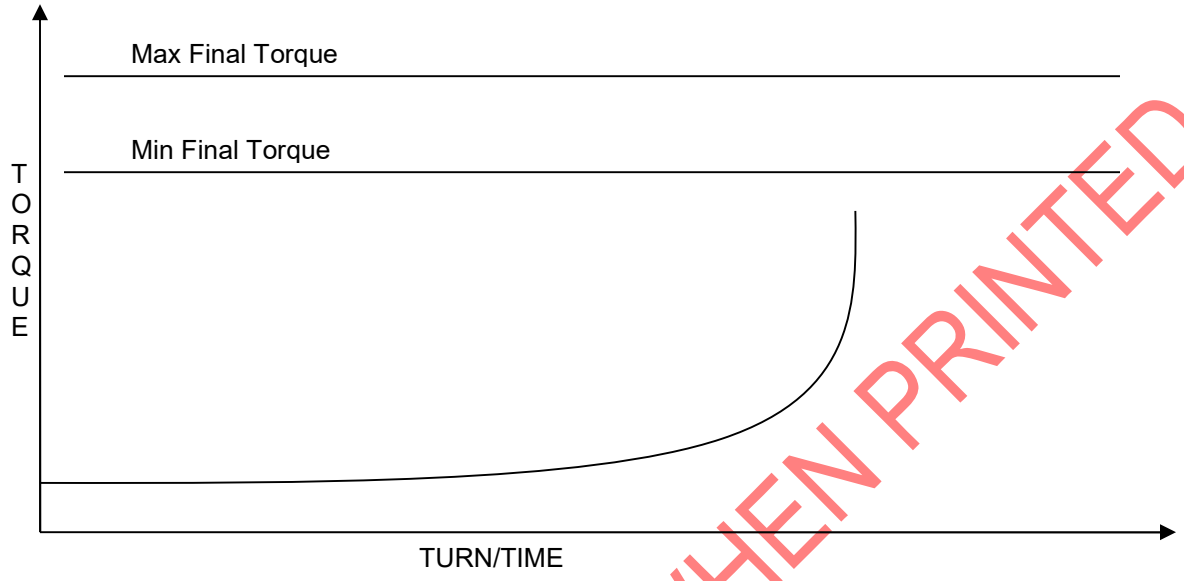

Figure 2: Below Min Final Torque

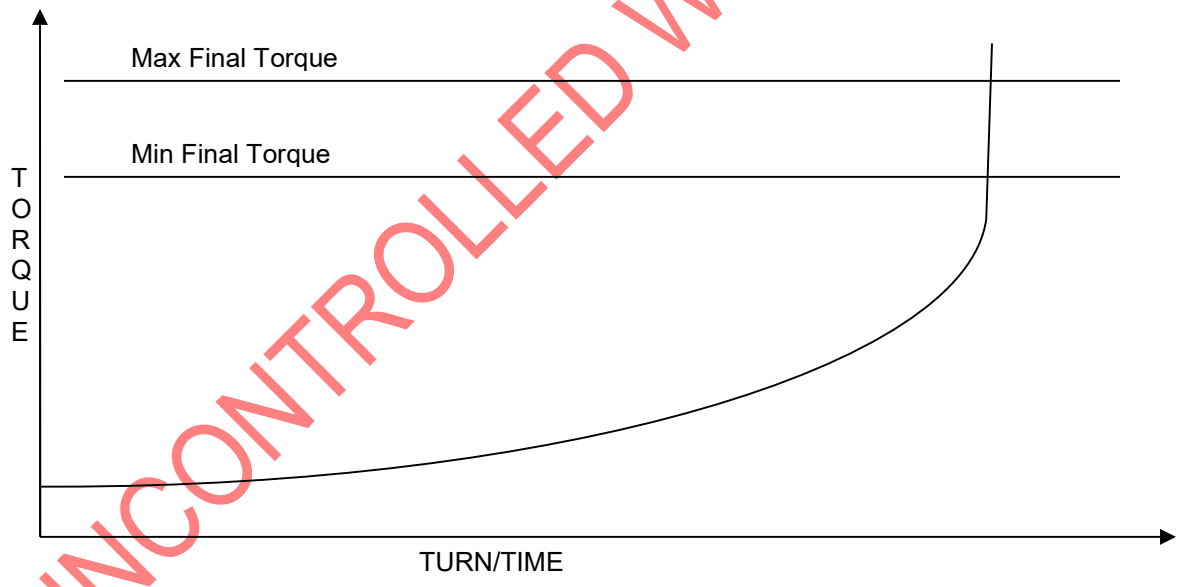

Figure 3: Exceeded Max Final Torque

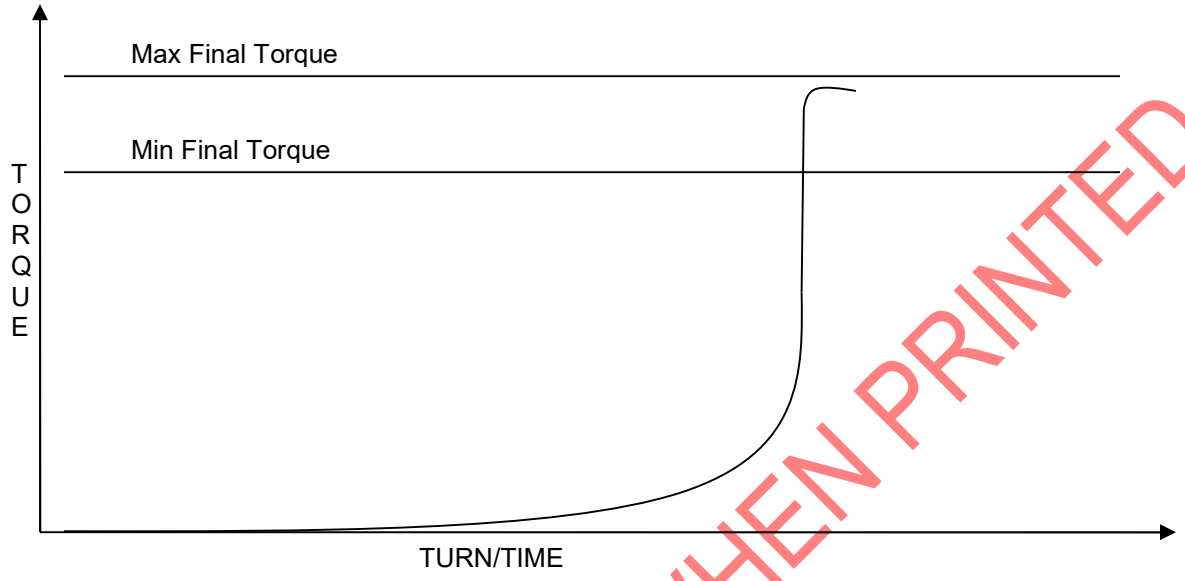

Figure 4: Yielding/deformation prior to final torque (Connection shall be rejected)

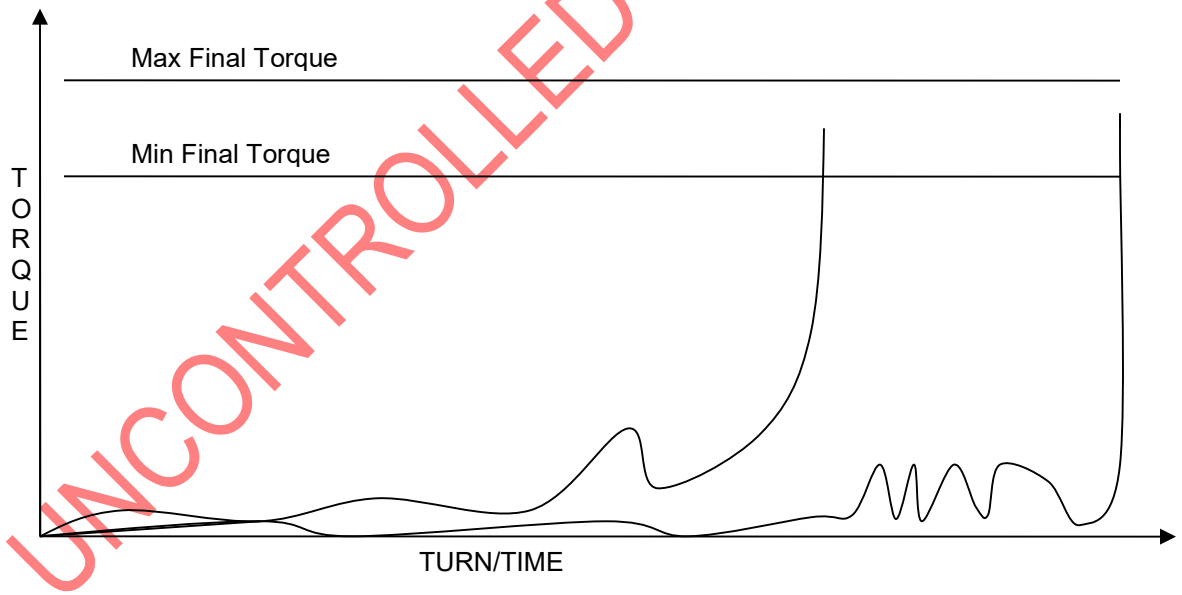

Figure 5: Irregularities in the make-up chart